



Objectives

3240-0101 Differentiate between common physical and chemical changes.

3240-0102 Analyze factors that influence chemical and physical change.

Intended Learning Outcomes

- 1a. Make observations and measurements.
- 1g. Construct models and simulations to describe and explain natural phenomena.
- 4d. Recognize the personal relevance of science in daily life.

INTRODUCTION!

TEACHERS... It would be wise to have a pre-made pie.

In this activity we will bake a very unusual apple pie. It will be unusual because it does not contain any apples. It will taste like apple pie and look like apple pie because our senses will be tricked into thinking that it is apple pie. We will use chemicals to produce the taste and flavor of apples and crackers pieces to resemble chunks of apples. Because our senses are easily tricked, as scientists we must use sensitive instruments to measure changes that occur around us. Have a few copies of the instructions available for students to take home and try.

Materials (work in groups of 3-4)

Pastry for two pie crusts [top and bottom]
 Box of crackers [e.g. Ritz] (NaCl, starch & proteins)
 Sugar (sucrose, $C_{12}H_{22}O_{11}$) **1.5 cups.**
 Butter (saturated fats) **1 tsp.**
 Cinnamon (carbohydrates & oils)
 Cream of tartar (potassium bitartrate, $KHC_4H_4O_6$) **1.5 tsp.**
 Pie pan (Aluminum, Al)
 Large pot (Aluminum, Al)

Procedure

PLEASE NOTE: THIS ACTIVITY IS INTENDED TO BE DONE OUTSIDE OF THE CHEMISTRY LAB.

1. Place 2 cups of water in the pot and heat it until it boils.
2. While the water is heating, mix the sugar and cream of tartar in a bowl.
3. Add the mixture to the boiling water, a little at a time and stir to dissolve completely.
4. Add 20-25 whole crackers, one at a time, to the boiling solution.
5. Boil for about 3 minutes, but do not stir.
6. Pour the mixture into a pastry-lined pie pan.
7. Sprinkle a small amount of cinnamon on top of the pie filling.
8. Melt the butter and drip it evenly over the filling.
9. Cover with a pastry top. Stick a knife through the top several times to allow steam to escape.
10. Bake the pie in a preheated oven at 450 degrees F for about 20 minutes or until the crust is brown.
11. Cool, and enjoy eating your experiment.
12. Hint: Cut each pie into as many pieces as you have in your class. Yes, you CAN cut a pie into 40 pieces. Be creative!

NOTE: The following pictures illustrate how your pie should look and how to cut your pie into **40** pieces. (Each will open in a new window. To return to this page close the browser window.)

PIE1 demonstrates a completely baked pie ready for searving.

PIE2 shows how to begin slicing to be able to obtain up to servings for 40 students from one pie.

PIE3 illustrates the size and shape of the servings given to each student.

Reaction

The cream of tartar produces a weak acid, which combines with other ingredients to produce the tangy taste of apples. The acid, combined with the pieces of solid cracker, closely resembles the taste and appearance of apple pie.

Questions

1. Find out how sucrose (table sugar) and the starch in flour are related
2. Why does this taste like an apple pie?
3. What happens to the chemicals you eat?

Safety concerns:



Teachers and students, you will be handling a hot "chemical" pie when done from the oven. Be sure to keep all Heat Safety and Chemical Safety Rules that are specified by your teacher and in all general laboratory experiences.



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